1. A set of chromosomal probes comprising any of the following combinations of two probes:

(a) a 5p chromosome arm probe and a probe selected from the group consisting of a 8q24 locus specific probe, a 3q chromosome arm probe, a 20q chromosome arm probe, a 7p12 locus specific probe, a chromosome 16 enumeration probe, a chromosome 4 enumeration probe, a chromosome 12 enumeration probe, a chromosome 6 enumeration probe, and a 17q21 locus specific probe;

(b) a 8q24 locus specific probe and a probe selected from the group consisting of a chromosome 17 enumeration probe, a chromosome 1 enumeration probe, and a chromosome 6 enumeration probe;

(c) a 7p12 locus specific probe and a probe selected from the group consisting of a 3q chromosome arm probe and a chromosome 6 enumeration probe;

(d) a 3q chromosome arm probe and a chromosome 7 enumeration probe; or

(e) a chromosome 6 enumeration probe and a chromosome 7 enumeration probe.

2. The set of chromosomal probes of claim 1, wherein detection moieties are attached to the two probes.

3. The set of chromosomal probes of claim 2, wherein the detection moieties comprise fluorescent labels.

4. The set of chromosomal probes of claim 1, wherein the two probes are coupled to different detection moieties.

5. The set of chromosomal probes of claim 4, wherein the detection moieties comprise fluorescent labels.

6. A set of chromosomal probes comprising any of the following combinations of three probes:

(a) a 5p15 locus specific probe, a 8q24 locus specific probe, and a probe selected from the group consisting of a 9p21 locus specific probe, a chromosome 1 enumeration probe, a chromosome 6 enumeration probe, a 7p12 locus specific probe, and a 17q21 locus specific probe;

(b) a 5p15 locus specific probe, a chromosome 12 enumeration probe, and a 9p21 locus specific probe;

(c) a 8q24 locus specific probe, a chromosome 17 enumeration probe, and a 9p21 locus specific probe;

(d) a 8q24 locus specific probe, a chromosome 1 enumeration probe, and a 9p21 locus specific probe; or

(e) a 5p15 locus specific probe, a 3q chromosome arm probe, and a chromosome 12 enumeration probe.

7. A set of chromosomal probes comprising any of the following combinations of four probes:

(a) a 5p15 locus specific probe, a chromosome 6 enumeration probe, a 17p13 locus specific probe, and a chromosome 17 enumeration probe;

(b) a 5p15 locus specific probe, a 8q24 locus specific probe, a chromosome 1 enumeration probe, and a 7p12 locus specific probe;

(c) a 5p15 locus specific probe, a 8q24 locus specific probe, a 3q chromosome arm probe, and a 7p12 locus specific probe;

(d) a 5p15 locus specific probe, a 8q24 locus specific probe, a 20q chromosome arm probe, and a 7p12 locus specific probe;

(e) a 5p15 locus specific probe, a 8q24 locus specific probe, a 7p12 locus specific probe, and a 17q21 locus specific probe;

(f) a 5p15 locus specific probe, a 8q24 locus specific probe, a chromosome 6 enumeration probe, and a 7p12 locus specific probe;

(g) a 5p15 locus specific probe, a 8q24 locus specific probe, a chromosome 6 enumeration probe, and a chromosome 1 enumeration probe;

(h) a 5p15 locus specific probe, a 8q24 locus specific probe, a chromosome 6 enumeration probe, and a chromosome 12 enumeration probe;

(i) a 5p15 locus specific probe, a chromosome 1 enumeration probe, a chromosome 6 enumeration probe, and a chromosome 12 enumeration probe;

(j) a chromosome 7 enumeration probe, a chromosome 1 enumeration probe, a chromosome 6 enumeration probe, and a chromosome 12 enumeration probe; or

(k) a 5p chromosome arm probe, a chromosome 1 enumeration probe, a chromosome 6 enumeration probe, and a chromosome 7 enumeration probe.

8. A method of screening for lung cancer in a subject, the method comprising:

(a) obtaining a biological sample from the subject;

(b) obtaining the set of chromosomal probes of claim 1;

(c) contacting the set of probes to the biological sample under conditions sufficient to enable hybridization of probes in the set to chromosomes in the sample, if any; and

(d) detecting the hybridization pattern of the set of chromosomal probes to the biological sample to determine whether the subject has lung cancer.

9. The method of claim 8, wherein the biological sample comprises a bronchial specimen, a lung biopsy, or a sputum sample.

10. The method of claim 8, wherein the chromosomal probes are fluorescently labeled.

11. The method of claim 8, further comprising performing cytological analysis on the sample.

12. A method of screening for lung cancer in a subject, the method comprising:

(a) obtaining a biological sample from the subject;

(b) obtaining a chromosomal probe selected from the group consisting of a 5p15 locus specific probe, a chromosome 1 enumeration probe, a 7p12 locus specific probe, a 8q24 locus specific probe, and a chromosome 9 enumeration probe;

(c) contacting the chromosomal probe to the biological sample under conditions sufficient to enable hybridization of the probe to chromosomes in the sample, if any; and

(d) detecting the hybridization pattern of the probe to the biological sample to determine whether the subject has lung cancer.

13. The method of claim 12, wherein the biological sample comprises a bronchial specimen, a lung biopsy, or a sputum sample.

14. The method of claim 12, wherein the chromosomal probes are fluorescently labeled.

15. The method of claim 12, further comprising performing cytological analysis on the sample.

16. A method of screening for lung cancer in a subject, the method comprising:

(a) obtaining a biological sample from the subject;

(b) obtaining the set of chromosomal probes of claim 6;

(c) contacting the set of probes to the biological sample under conditions sufficient to enable hybridization of probes in the set to chromosomes in the sample, if any; and

(d) detecting the hybridization pattern of the set of chromosomal probes to the biological sample to determine whether the subject has lung cancer.

17. A method of screening for lung cancer in a subject, the method comprising:

(a) obtaining a biological sample from the subject;

(b) obtaining the set of chromosomal probes of claim 7;

(c) contacting the set of probes to the biological sample under conditions sufficient to enable hybridization of probes in the set to chromosomes in the sample, if any; and

(d) detecting the hybridization pattern of the set of chromosomal probes to the biological sample to determine whether the subject has lung cancer.

18. The method of claim 17, wherein the set of chromosomal probes comprises a 5p15 locus specific probe, a 8q24 locus specific probe, a chromosome 6 enumeration probe, and a 7p12 locus specific probe.

19. The method of claim 17, wherein the set of chromosomal probes consists of a 5p15 locus specific probe, a 8q24 locus specific probe, a chromosome 6 enumeration probe, and a 7p12 locus specific probe.

20. A method of selecting a combination of probes for the detection of cancer, the method comprising:

providing a first plurality of chromosomal probes;

determining the ability of each of the first plurality of probes to distinguish cancer specimens from normal specimens;

selecting those probes within the first plurality of probes that identify the cancer specimens as compared to the normal specimens to yield a second plurality of probes, wherein each probe within the second plurality of probes identifies the cancer specimens as compared to the normal specimens at a p value of less than 0.01 or a vector value of less than 0.500;

determining the ability of a combination of probes selected from the second plurality of probes to distinguish the cancer specimens from the normal specimens; and

selecting a combination of probes that identifies the cancer specimen as compared to the normal specimen with a vector value of less than 0.400.